

**NOTICE OF APPEAL FROM THE EXAMINER TO
THE BOARD OF PATENT APPEALS AND INTERFERENCES**Docket Number (Optional)
GEMS8081.191

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on December 27, 2005

Signature

Jessica A. Calaway

Typed or printed

name Jessica A. CalawayIn re Application of
PetersApplication Number
10/707,433Filed
12/12/2003For METHOD AND APPARATUS TO CORRECT
AMPLITUDE MODULATION IN MULTI-ECHO MAGNETIC
RESONANCE IMAGINGArt Unit
2859Examiner
Ruth S. SmithApplicant hereby **appeals** to the Board of Patent Appeals and Interferences from the last decision of the examiner.

The fee for this Notice of Appeal is (37 CFR 41.20(b)(1))

\$ 500.00

☐ Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee shown above is reduced by half, and the resulting fee is:

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I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest.
See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed.
(Form PTO/SB/96)

☒ attorney or agent of record.
Registration number 48865

☐ attorney or agent acting under 37 CFR 1.34.
Registration number if acting under 37 CFR 1.34. _____

J. Mark Wilkinson
Signature
J. Mark Wilkinson
Typed or printed name

(262) 376-5170

Telephone number

12/27/05
Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 41.31. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 450, Alexandria, VA 22313-1450.

Customer No. 27061

Patent
Attorney Docket No. GEMS8081.191

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of : Peters, Robert D.
Serial No. : 10/707,433
Filed : December 12, 2003
For : Method and Apparatus to Correct Amplitude Modulation in
Multi-Echo Magnetic Resonance Imaging
Group Art No. : 2859
Examiner : Fetzner, T.

CERTIFICATION UNDER 37 CFR 1.8(a) and 1.10

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37 CFR 1.8(a)

37 CFR 1.10

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Date: December 27, 2005

/Jessica A. Calaway/
Signature

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PRE-APPEAL BRIEF REQUEST FOR REVIEW

Dear Sir:

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request. The request is being filed with a Notice of Appeal. The review is requested for the reasons set forth hereinafter.

REMARKS

Claims 1-14, 16-22, and 24-26 are pending in the present application. In the Final Office Action mailed September 28, 2005, the Examiner rejected claims 1-8, 19-22 and 24 under 35 U.S.C. §130(a) as being unpatentable over the Le Roux et al. article. The Examiner next rejected claims 1, 9-14, 16-19, 25 and 26 under 35 U.S.C. §103(a) as being unpatentable over Sandford et al. USP 5,451,876, in view of the Le Roux et al. article. The Examiner also objected to claims 1-11.

The Examiner rejected claims 1-8, 19-22, and 24 under 35 U.S.C. §103(a) as being unpatentable over Le Roux et al. In setting forth the aforementioned rejection, the Examiner asserted that the reference teaches or suggests the post-data acquisition step of correcting acquired data for amplitude modulation effects. However, the reference makes no such teaching. In fact, the reference teaches away from such a retrospective approach.

Specifically, in its Abstract, Le Roux et al. “describes an algorithm permitting the generation of sequences of nutation angles yielding series of echos with constant signal magnitudes.” LE ROUX ET AL., *Stabilization of Echo Amplitudes in FSE Sequences*, MRM 30:183-191 (1993), p. 183. Le Roux et al. teaches that by varying “the nutation angle of each pulse in a controlled manner” the amplitude of the echoes can be kept “constant”. LE ROUX ET AL., *supra* at p. 186. Based on the explicit teachings of Le Roux et al., one skilled in the art would readily recognize that the reference is directed to a pre-data collection technique. That is, the reference is clear that its authors provide a solution for the stabilization of echo amplitudes in FSE sequences by, not correcting the acquired k-space data, but rather, by varying the value of the nutation angle of each refocusing pulse of a pulse sequence used to acquire k-space data. One skilled in the art will recognize that the pulse sequence characterizes the manner by which spins are excited, encoded, and sampled. A pulse sequence is not used to correct for data that is already acquired. Thus, Le Roux, et al. neither teaches nor suggests a method or system for correcting acquired k-space data for amplitude modulation effects in an FSE acquisition. Therefore, claims 1-8, 19-22, and 24 call for subject matter patentably distinct from that taught and/or suggested by the Le Roux et al. Allowance thereof is requested.

The Examiner then rejected claims 1, 9-14, 16-19, 25, and 26 as being unpatentable over the combination of Sandford et al. and Le Roux et al. Just as Le Roux et al. alone fails

to teach or suggest the claimed invention, the addition of Sandford et al. does not render the claimed invention unpatentable.

As established above, Le Roux et al. is not directed to a post-data acquisition process. Applicant agrees that Le Roux et al. does pertain to fast spin echo acquisitions, however, the reference must be considered as a whole when determining whether there is a motivation to combine multiple references. To support the combination of Le Roux et al. and Sandford et al., the references themselves must suggest the receiver gain technique of Sandford et al. being incorporated with the pulse sequence design technique of Le Roux et al., or vice-versa. There is simply no such motivation in the references.

Sandford et al. is directed to an MRI system with dynamic receiver gain whereby the gain of a receiver is dynamically changed during a scan to provide an optimal SNR figure without over-ranging the transceiver's A/D converter. In this regard, Sandford et al. teaches a system that picks up an NMR signal produced by a subject with a receiver coil and the NMR signal is amplified by an amount determined by a digital attenuation signal received from a backplane. *See* SANDFORD ET AL., col. 4, ll. 37-43. Sandford et al. teaches a signal modification technique that "chang[es] the digital attenuation signal applied to the receiver during the scan so that NMR signals of widely varying amplitude can be acquired at an improved SNR." SANDFORD ET AL., col. 5, ll. 3-7. In this regard, the reference teaches the normalization of acquired NMR signals so that the amplitude of an acquired signal is adjusted to account for its receive attenuation used during acquisition. *See* SANDFORD ET AL., col. 5, ll. 5-10. In other words, Sandford et al. discloses an imaging technique that amplifies an NMR signal for improved SNR and normalizes the amplified NMR signal to account for the amplification.

Le Roux et al. is directed to a pulse sequence design technique for generating pulse sequences of nutational angles that yield a series of echoes with constant signal magnitudes. As such, one reference (Sandford et al.) is concerned with improving SNR and the other reference (Le Roux et al.) is concerned with signal magnitude variations in early echoes when refocusing pulses are not exactly 180 degrees. *See* LE ROUX ET AL., *supra* at p. 183, Abstract. As such, there is simply no motivation to combine the teachings of the references.

Moreover, assuming the requisite motivation, there is no reasonable expectation of success that one skilled in the art would arrive at the claimed invention. Combining the pulse sequence design technique of Le Roux et al. with the SNR improvement technique of

Sandford et al. results in a pulse sequence constructed to reduce the signal variations in early echoes of an echo train followed by the amplification of the sampled signal to improve SNR. As such, one skilled in the art would not arrive at the claimed invention of post-data collection processing of acquired k-space data to correct for amplitude modulation in a FSE acquisition.

Third, the references fail to teach or suggest each and every element of the claims. Le Roux et al. teaches a pre-data acquisition technique. The present invention is directed to post-data acquisition. Sandford et al. teaches an “MRI system in which receiver gain is dynamically adjusted during a scan to optimize the SNR for each received NMR signal.” SANDFORD ET AL., col. 2, ll. 1-6. Sandford et al. then teaches that the NMR signals are adjusted to normalize out the differences in amplitude and phase caused by the varying gain settings; however, that normalization does not correct for amplitude modulation effects in an FSE sequence. The technique of Sandford et al. simply involves the normalization of signals that were arbitrarily amplified to improve SNR. In other words, the amplitude modulation effects present in an FSE acquisition using the technique of Sandford et al. will be amplified and then later normalized to account for receiver gain settings during data acquisition. Sandford et al.’s technique will not correct for the amplitude modulation effects in the FSE acquisition itself. As such, not only is there no motivation to combine the references nor a reasonable expectation of arriving at the claimed invention based on the combination, the references themselves fail to teach or suggest each and every element of the claims. Therefore, claims 1, 9-14, 16-19, 25, and 26 are believed to be in condition for allowance.

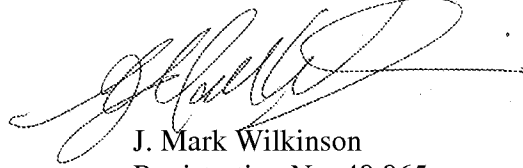
Additionally, as set forth in the Advisory Action mailed November 8, 2005, the Examiner has concluded that claim 1 can be interpreted as a pre-data acquisition process whereby a pulse sequence is corrected. However, as set forth in claim 1, it is clear that the “acquired data” is “corrected”. In this regard, data that is acquired with a FSE pulse sequence is corrected rather than the pulse sequence being corrected.

Also, regarding the outstanding objection to claims 1-11 for not calling for “MR k-space data,” Applicant believes that claims 1-11 comply with the statutory provisions of Title 35 of the U.S. Code. While the Examiner may prefer certain claim language, Applicant has the right to define the claims as desired. Therefore, as it is believed that claims 1-11 not only define the invention over the art of record, but also comply with the statutory requirements of Title 35 of

the U.S. Code, it is not believed that any amendments are needed to claims 1-11 and, as such, withdrawal of the objections to claims 1-11 is also requested.

Therefore, in light of at least the foregoing, Applicant respectfully believes that the present application is in condition for allowance. As a result, Applicant respectfully requests favorable consideration of claims 1-14, 16-22, and 24-26.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'J. Mark Wilkinson', is written over a horizontal line.

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Dated: December 27, 2005
Attorney Docket No.: GEMS8081.191

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